RESEARCH HIGHLIGHTS

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Socio-Economic Series 03-010

EVALUATION OF OPTIMAL BATH GRAB BAR PLACEMENT FOR SENIORS

Introduction

Accidental falls–especially in the home and, in particular, in the bathroom–are the most common barrier to independent living for older adults. They are also a major cause of fatal and non-fatal injury. Bathing (which involves entering and exiting the bathtub and sitting down and standing up) is a particularly difficult and dangerous activity for many seniors. Grab bars are among the most useful tools for preventing injury; however, studies show that most grab bars are awkwardly positioned and do not provide optimal support.

Objective

The objective of the study was to determine the perceived and actual usefulness, safety and patterns of use for five different configurations of bathtub grab bars.

Methodology

Researchers assembled a sample of 103 seniors (with a mean age of 70 and all living in their own homes in the Ottawa area) and tested a series of grab bar configurations with them in a laboratory setting at the University of Ottawa. The entire testing process took on average about 59 minutes per participant. Because of fatigue or disability, nine of the participants did not sit and stand in the bathtub for at least one configuration; three did not sit and stand up for any.

Part I: Researchers interviewed participants to determine health and levels of activity, bathing practices, history of falls and other socio-demographic information. They also gathered information about the number and placement of grab bars in the respondents' own houses. As well, participants underwent two clinical balance tests: Timed Up-and-Go (TUG) and the One-Legged Stance (OLS). Those using walking aids completed the TUG test both with and (if it was considered safe to do so) without using the aid.

Part II: The researchers evaluated a series of grab bar configurations in a bathtub testing area (part of the multi-purpose Occupational Therapy laboratory at the university), which has been designed to simulate a normal residential bathroom. The location and orientation of the grab bars were set for each individual participant according to the location of the faucet in his or her actual home. Individuals in the sample were invited to perform a series of movements associated with bathing (especially getting in and out of the bathtub and sitting down and getting up) with each of five configurations. Immediately after testing each configuration, participants rated it on a 1-6 evaluation scale in terms of: safety, ease of use, helpfulness and comfort. Later, they ranked all configurations in order of preference according to the following criteria: safety, ease of use, preference, acceptability, comfort and helpfulness. Finally, they were asked to draw an "ideal" configuration for their own needs. Participants were videotaped during the second part of the study.

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Grab bar configurations

Figure 1: Canadian Standards Association (CSA) configuration

The CSA configuration is one horizontal grab bar, 120 cm long, and one vertical grab bar, 120 cm long. Both grab bars are 18 cm above the rim of the tub. The horizontal bar is on the back wall of the tub. The vertical grab bar is on the same wall as the tub faucet.

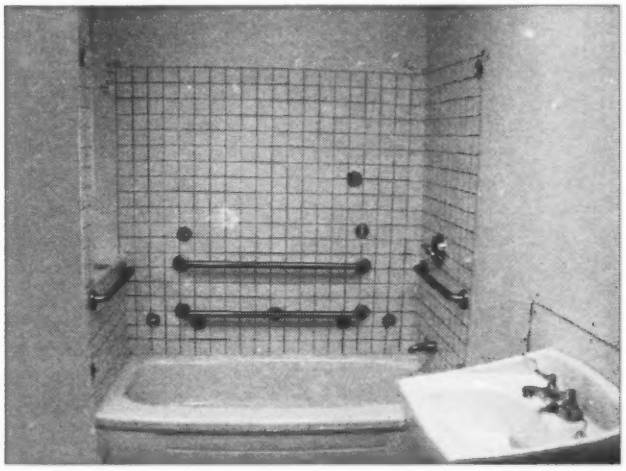

Figure 2: U.S. Uniform Accessibility Standards (UFAS) configuration

The UFAS configuration is four horizontal grab bars. Two are mounted on the back wall; the third is mounted on the faucet wall; the fourth, on the wall opposite the faucet wall. Each back wall grab bar is 82 cm long.

The lower back wall grab bar is 23 cm above the rim of the tub. The upper is 48 cm above the rim of the rub. The bars on the faucet wall and the wall opposite the faucet wall are each 61 cm long and mounted 48 cm above the rim of the tub.

Figure 3: Ontario Building Code (OBC) modified configuration

The OBC modified configuration is an "L"-shaped bar mounted on the back wall. Each side of the "L" is 75 cm long. The leg parallel to the rim of the tub is 17 cm above the rim. The vertical bar, at a 90-degree angle to the bottom of the "L," is 38 cm from the faucet wall.

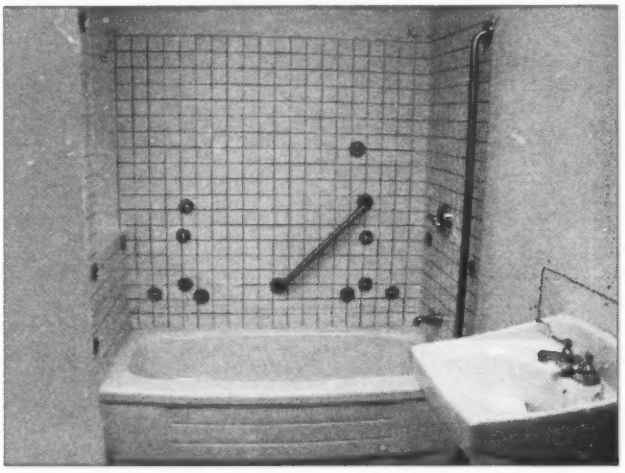

Figure 4: Ottawa-Carleton Common (OCC) configuration

The OCC configuration is two bars. The bar on the back wall is 60 cm long. It is mounted at a 45-degree angle, with the lowest point 23 cm above the rim of the tub, 74 cm from the faucet wall. The highest point of the bar is 30 cm from the faucet wall. The second grab bar is on the faucet wall. It is vertical, 120 cm long, and 18 cm above the rim of the bathtub.

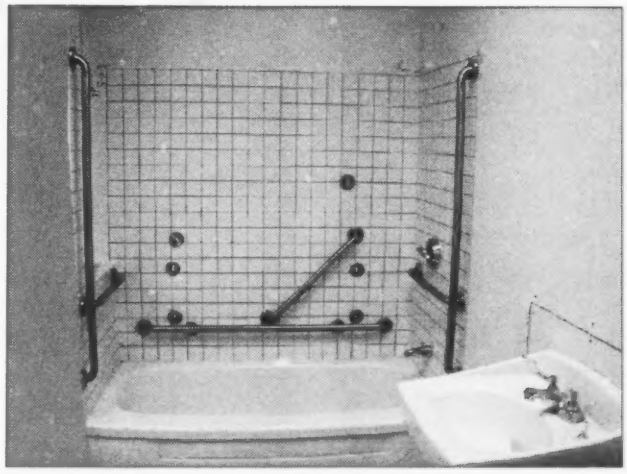

Figure 5: All Bars configuration

The All Bars configuration is a composite of the CSA, UFAS, OBC modified and OCC configurations.

Results

Part I: The sample population was relatively healthy and reflected the general demographic and health profiles of seniors living in the Ottawa-Carleton Region. Nearly two-thirds of them rated their health as very good; only seven individuals reported fair or poor health, although 29 of them also reported three or more health problems. Only two bath-related falls and injuries were reported over the last year. However, almost one-third of participants reported balance problems, even those who did not use mobility aids; 15 per cent reported difficulty getting in and out of the tub; and 40 per cent reported difficulty sitting down and getting up in the bathtub. Two participants had restricted their bathing practices as a result.

Most study participants (64.1 per cent) did not have grab bars installed in their own bathrooms, although most of those that did (78.4 per cent) reported using them regularly. Only 11 of the total sample had two or more grab bars installed, even though this is considered the required minimum. Most existing bathroom grab bars were installed horizontally or at an angle on the wall behind the tub; however, 20 per cent of respondents with grab bars at home also reported a bar on the rim of the bath[1].

Most participants were able to complete all elements of the study.

Part II: The ratings for each configuration (except for the OBC) were consistent for all factors, which suggests that one composite score could be used in future studies. It also suggests that preference, acceptabililty and usefulness are strongly related to safety in the minds of seniors. The grab bar configurations ranked overall as follows:

Rank # 1 All Bars;
Rank # 2 OCC;
Rank # 3 UFAS;
Rank # 4 CSA; and
Rank # 5 OBC.

[1] There are safety concerns associated with the rim-mounted horseshoe configuration. Although it was not included in the present study, this configuration may require further examination.

The last two configurations ranked significantly lower than the others. The OBC was the only configuration that lacked a second bar on the entry wall. Also, the L-shaped bar was relatively ineffective in helping participants get in and out of the tub. The reasons for the low ranking of the CSA configuration are not fully understood as yet but may have to do with the excessively low positioning of the back wall bar.

Most participants, irrespective of health or demographic profile, found the grab bars useful. This suggests a universal acceptance of the usefulness of grab bars among seniors.

All but one participant used at least one grab bar at some time within each test; 10 per cent did not use a bar to get in or out of the bathtub, but supported themselves on the wall instead; the few who did not use the bars to sit down or stand up (5.9 and 7.8 per cent, respectively) used the rim of the bathtub instead for support.

1. For getting into the bathtub: most used the OCC configuration (68.8 per cent); the OBC was used least (45.1 per cent). When given the option of All Bars, people used the vertical bar on the faucet wall most, followed by the angled bar on the back wall (32.3 and 20.6 per cent, respectively).
2. For sitting down: there were no significant differences for the five configurations, although the CSA configuration was most used (87.3 per cent). Given the All Bars option, most participants used the angled or horizontal bar on the back wall for assistance (43.1 and 31.4 per cent, respectively).
3. For standing up: there were no significant differences for the five configurations, although the UFAS was most used (86.3 per cent). Given the All Bars option, most participants used the angled or horizontal bar on the back wall (54.9 and 21.6 per cent, respectively).
4. Getting out of the bathtub: the OCC was the configuration most used (62.7 per cent). The OBC was least-used (30.4 per cent). Given the All Bars option, most participants used the vertical bar on the faucet wall or the angled bar on the back wall (32.3 and 16.7 per cent, respectively).

Almost all participants (99 per cent) used other supports as well as the grab bars, notably the wall (42.2 per cent) and the bathtub rim (99 per cent). Walls (especially faucet walls) were used as a support getting into the tub, especially in relation to the OBC configuration. The rim of the bathtub was used by almost all participants for assistance in sitting down and standing up (the front rim, 99 per cent; the back rim, 29.1 per cent).

When asked to identify the "ideal" configuration, nearly 40 per cent of the participants preferred a system with two bars–one vertical bar on the faucet wall to help them in entering and exiting the tub and another horizontal (or angled) on the back wall to help in getting up and sitting down; 20.4 per cent felt they needed only one bar on the back wall, while 22.6 per cent wanted three (on the back, faucet and head walls respectively). This preference is consistent with the analysis of actual use within the study. In addition, 20 per cent of participants requested a bar on the rim of the bathtub.

Recommendations

1. A minimum of two grab bars should be installed in all bathtubs used by seniors, one on the faucet wall (vertical) for entering and exiting the tub, and one on the back wall (horizontal or on an angle) to help with sitting down and standing up.
2. On the faucet wall, a second horizontal bar is also useful in entering the tub and, as long as the bar extends beyond the edge of the tub, for exiting as well.
3. Though a horizontal or angled bar on the back wall is most useful in helping individuals to sit down or stand up, the configuration may vary according to the specific needs of users.
4. Non-slip surfaces on edges (bathtub rims, front and back) should be incorporated as safety features in bathtubs used by seniors.
5. In new bathtub constructions, a "U-shaped" drywall reinforcement in the back wall, along with an "L- or inverted T-shaped" drywall reinforcement area in each the faucet and head wall, should be incorporated to facilitate the installation of secure and appropriate grab bars.

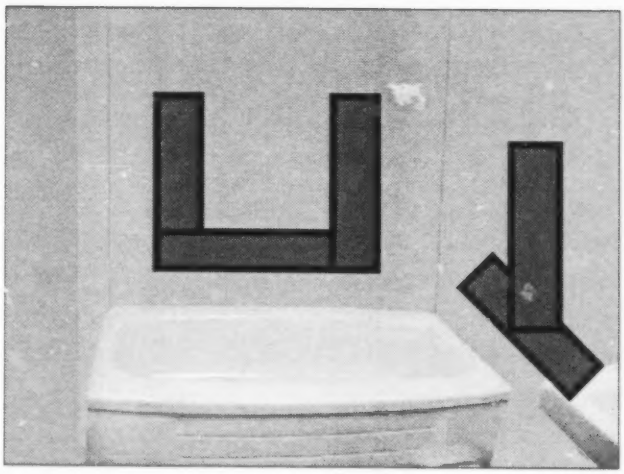

Figure 6: The dark blocks indicate the "U-shaped" and "Inverted T-shaped" wall areas requiring reinforcement for grab bar installation.

Suggestions for Further Research

Future research should be carried out:

1. To address possible social, cultural and affective bias against the use of assistive devices (specifically, a negative perception of frailty and aging that may be associated with a decision to install grab bars).
2. To determine why seniors do not install grab bars.
3. To determine the level of safety, ease of use and helpfulness of rim-mounted bathtub grab bars.
4. To address the level of coherence between an individual's self-reported behaviour and actual behaviour when performing bathtub-related tasks.

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